REVERSE LOGISTICS PRACTICES AND PROFITABILITY OF LARGE SCALE MANUFACTURING FIRMS IN NAIROBI, KENYA

BY

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DECLARATION

This research project is my original work and has not been presented to any other institution. No part of this project may be reproduced or transmitted in any form or by any means, including photocopying, recording or any information storage or retrieval system, without permission from the author or that of the University of Nairobi.

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DEDICATION

This project is dedicated to my mum (Kate) for her sacrifice to see me through my education and to a friend and lecturer Mr. Mugo Karungu for his encouragement to pursue postgraduate studies while still an undergraduate student.

ABSTRACT

Reverse Logistics is an issue that has received growing attention, above all, in the last decade, given the confluence of several situations. Reverse logistics is becoming a key initiative today, this is due to a number of factors for example, of all the products sold, an average of eight to twelve percent is returned. Among the key players in reverse logistics are manufacturing firms, NEMA, UNEP and the Council for Logistics who play an integral role in fostering reverse logistics practices. With this understanding, the objectives of this study were: to determine reverse logistics practices used by large scale manufacturing firms in Nairobi, Kenya and to establish the relationship between reverse logistics practices and profitability of large scale manufacturing firms in Nairobi, Kenya. The study used a descriptive survey design; the population of the study included all large scale manufacturing firms in Nairobi, Kenya. The study considered Nairobi because this is where most of the large scale manufacturing firms in various sectors are concentrated and thus providing a population where a proportionate sample could be derived. The sample size for this study involved 46 respondents. This was arrived at through a formula developed by Kelley and Maxwell (2003) as shown below: 0.101=Sample Size/Total population (0.101*455) =46.This formula was derived from a series of samples assuming non zero probability. The study used primary and secondary data that was collected through a self-administered questionnaire designed to elicit specific responses for qualitative and quantitative analysis respectively. The results of the regression analysis revealed that there was a direct relationship between reverse logistics practices and profitability of large scale manufacturing firms. From the results, 52.4 % explains the variance on the effect of reverse logistics practices on profitability of large scale manufacturing firms. The variables in the regression model contribute to (R=72.4), 72% level of explanation. From the tests, there was statistically significant relationship between the variables since the p-values of all the independent variables from the table above are less than 5%.The study concluded that the most popular reverse logistics activities conducted most firms is receiving returned product from customers, while the number of manufacturers that conducted the other activities such as remanufacturing, reconditioning, landfill practices and repackaging and even recycling was quite high. The study recommends that it would be a good idea to investigate the influences of various factors such as government regulations, environmental awareness or any other factors either as independent or moderating mediating variables that can influence manufacturer's decision in adopting reverse logistics activities. The limitation of this study was that the respondents were not willing to commit their time to respond to the questionnaires. Most of the respondents agreed to participate only on condition that the information will not be divulged to any other party other than for academic purposes only.

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LIST OF ABBREVIATIONS

GoK	Government of Kenya
GSCM	Green Supply Chain Management
KAM	Kenya Association of Manufacturers
NEMA	National Environmental Management Authority
NIAT	Net Income After Tax
RL	Reverse Logistics
ROACE	Return on Capital Employed
SCM	Supply Chain Management
UNEP	United Nations Environment Program
US	United States

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the contemporary business world, companies are looking for ways to improve their businesses by reducing costs and improving labour efficiency in order to increase their profits. Reverse Logistics is an issue that has received growing attention, above all, in the last decade, given the confluence of several situations. On the one hand, there is a verifiable concern about environmental matters and sustainable development. In this sense, several are the legal regulations that have been passed in a number of countries, being perhaps the pioneers, Germany with its taking-back packaging and electronic devices regulations and Netherlands with its stringent automobile laws (Arman, Hanna and LaForge, 2001).

However, the effect has quickly spread out along Europe, USA and Japan, among others. On the other hand, economical reasons have also had their contribution in this increasing importance of Reverse Logistics issues (Carter and Ellram, 1998).By means of the returned products, companies stand the possibility of recovering either constituent material, that no longer need to be purchased in the same quantities, or added-value (Tibben-Lembke and Rogers, 2002).Whether the savings come only from materials purchasing costs or from materials, labor and overhead costs respectively, firms are increasingly interested in being efficiently involved as market competition shrink more and more the margins (Barry, Girard & Perras, 1993).

The examination of reverse logistics has become more prominent in both the business community and academia in recent years, spanning such diverse areas as recycling,

remanufacturing, information technology, warehousing, operations, and environmental sustainability, among others (Dowlatshahi, 2012). Globally, logistics managers realize that the reverse channel is a target for gains in efficiency and reduction of costs and have started to give more attention to this area, thus employing reverse logistics as a potential market differentiator and profit center (Stock and Mulki, 2009).Such differentiation may allow firms to maintain or gain market share, increase revenue, and possibly reduce transportation and inventory costs through efficiencies gained within their supply chain processes (Manson, 2002).

1.1.1 Reverse Logistics Practices

Reverse logistics is the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics. Reverse logistics is more than reusing containers and recycling packaging materials. Redesigning packaging to use less material, or reducing the energy and pollution from transportation are important activities, but they might be secondary to the real importance of overall reverse logistics (Atasu & Cetinkaya, 2006).

The main reverse logistics practices adopted by manufacturing firms are namely remanufacturing practices, recycling practices, packaging practices, landfill practices and reverse engineering practices. A firm should consider its customer needs when executing a reverse logistics process in order to meet their expectations; this cannot be

achieved without top management support. The management should allocate resources necessary for reverse logistics through employee training and managing of relationships with its partners and customers. Communication is an essential component in a reverse logistics process since it ensures an effective response to customers' service problems to meet the needs of the customers (Atasu and Cetinkaya,2006).

The process of reverse logistics helps in costs saving through the use of environmental friendly products that require less processing as compared to manufacturing a new product. A formalization process is important in reducing costs of a firm since it defines the rules and procedures in determining whether the products should be scrapped, discarded, repaired, overhauled or sold in a secondary market. This process is essential in cultivating production of environmental friendly products by manufacturing firms in order to compete against competitors since the customers are confident about the products (Dowlatshahi, 2005).

1.1.2 Firm Profitability

Maheshwari (2001) notes that profitability of a firm means ability to make profit from all the business activities of an organization, company, firm, or an enterprise. It shows how efficiently the management can make profit by using all the resources available in the market. Profitability is the 'the ability of a given investment to earn a return from its use (Srivastava and Srivastava, 2006).Profit maximization is said to be the main objective of all firms. In a competitive marketplace, a business owner must learn to achieve a satisfactory level of profitability. Increasing profitability involves determining which areas of a financial strategy are working and which ones need improvement. The management of any firm is charged with a responsibility of making the

right decisions that would maximize the returns of an organization. In reality, firms do have profits targets, and sometimes they pay managers for reaching them, but the goals of firms are broader than profits alone (Chandra, 2002).

Every firm is most concerned with its profitability. One of the most frequently used tools of financial ratio analysis is profitability ratios which are used to determine the company's bottom line and its return to its investors. Profitability measures are important to managers and owners of a manufacturing firm since they show the overall efficiency and performance of a manufacturing firm. Profitability ratios can be divided into two types namely margin and returns (Petersen and Kumar.2010).Ratios that show margins represent the ability of a manufacturing firm to translate sales into profits at various stages of measurement. Ratios are essential tools for measuring profitability of manufacturing firms because they illustrate the ability of a manufacturing firm to measure the overall efficiency of the in generating returns to its shareholders (Khan & Jain, 2003)

Margin Ratios are used in measuring the profitability of a firm for instance gross profit margin which looks at the costs of goods sold as a percentage of sales. The other measure is operating profit margin also known as EBIT which measures overall efficiency of the manufacturing firm (Maheshwari, 2001).The other measure of profitability in manufacturing firms is return on assets ratio which measures efficiency with which the company is managing its investment in assets and using them to generate profit. It measures the amount of profit earned relative to the firm's level of investment in total assets. The other measure of profitability is return on equity ratio, this measure of profitability is significant in measuring the return on the

money the investors have put into the manufacturing firm which is a ration of net income divided by stockholders equity (James et al., 2005).

1.1.3 Manufacturing Firms in Kenya

Since independence, the Kenyan economy has remained predominantly agriculture, with industrialization remaining an integral part of the country's development strategies. The industrial sector's share of monetary GDP has remained about 15-16% while that of manufacturing sector has remained at a little more than 10% over the last two decades. Manufacturing activities account for the greatest share of industrial production output and form the core of industry (KAM, 2013).

Manufacturing sector makes an important contribution to the Kenyan economy and currently employs 254,000 people, which represents 13 per cent of total employment with an additional 1.4 million people employed in the informal side of the industry. The sector is mainly agro-based and characterized by relatively low value addition, employment, and capacity utilization and export volumes partly due to weak linkages to other sectors (Ngui, 2008). The intermediate and capital goods industries are also relatively underdeveloped, implying that Kenya's manufacturing sector is highly import dependent (World Manufacturing Production, 2014).

Additionally, the sector is highly fragmented with more than 2,000 manufacturing units hence divided into several broad sub-sectors, as shown in figure. The top three manufacturing subsectors account for 50 per cent of the sector GDP, 50 per cent of exports, and 60 per cent of formal employment. Nearly 50 per cent of manufacturing firms in Kenya employ 50 workers or less. Most manufacturing firms are family-owned and operated. In addition, the bulk of Kenya's manufactured goods (95 per

cent) are basic products such as food, beverages, building materials and basic chemicals. Only 5 per cent of manufactured items, such as pharmaceuticals, are in skill-intensive activities (KAM, 2013).Manufacturing firms in Kenya are mainly focusing on becoming efficient and flexible in their manufacturing methods in order to increase their profits and ensure that they produce environmental friendly products that boost trust and confidence of consumers (Bolo & Wainaina, 2011).

1.2 Statement of the Problem

Reverse logistics is becoming a key initiative today, this is due to a number of factors for example, of all the products sold, an average of eight to twelve percent is returned. Logistics managers have realized that the reverse channel is a target for gains in efficiency and reduction of costs and have started to give more attention to this area, thus employing RL as a potential market differentiator and profit center. Such differentiation may allow firms to maintain or gain a market share, increased revenue, and possibly reduce transportation and inventory costs through efficiencies gained within their RL processes (Daughterty et al., 2005).

Reverse logistics practices is one of the most essential tools in achieving this objective. Kenya aims to become the provider of choice for basic manufactured goods in Eastern and Central Africa This can be done through adoption of reverse logistics practices by all manufacturing firms in Kenya to increase production and enhance efficiency in production. The manufacturing industry is an important sector in Kenya as it makes a substantial contribution to the country's economic development. According to the Economic Recovery Strategy for Employment and Wealth Creation Report, the manufacturing sector in Kenya is a major source of growth, still with high potential for growth and investment. The role of the manufacturing sector in Vision

2030 is to create employment and wealth (Gok, 1994).As a result, this has heightened the need for alternative means to increase profitability to facilitate growth and expansion, many manufacturers are prepared to look at more effective and efficient ways of reducing both returns and their associated costs but are not prepared to allocate the necessary resources for this operation, most manufacturing firms are looking for ways to make RL a profit center instead of a cost center, such as deriving greater levels of residual value from returns is one way to reduce perceived costs (Genchev, Richey and Gabler, 2011).

Autry (2005) notes that in 2010, there were more than 1,000 different items recalled from the marketplace by various U.S. government regulatory agencies from manufacturing firms. Among others, these included recalls for toys, pharmaceuticals, consumer electronics, medical devices and automotive parts. The reasons for the recalls ranged from issues with packaging and warning labels to hazardous conditions created by the products. In addition to fines and penalties from regulatory agencies, there is a greater potential liability from lawsuits and the impact on company sales from bad press. Minimizing all of these potential risks from recalled products is a major driver behind the need to develop a comprehensive reverse logistics program to reduce costs and enhance profitability of firms. The weakness of this study is that it did not address issues of reverse logistics practices in large scale manufacturing firms.

A study was carried out by Huscroft, Dianne and Hanna (2013), it was found that reveres logistics was an important tool in enhancing profitability of manufacturing firms. Rogers et al (1999) concluded that operating expenses can be reduced through effective and innovative returns management programs. In addition to minimizing costs relative to returns processing, customer service costs can be reduced if the return

process is streamlined from a customer's perspective. The above studies did not discuss issues of reverse logistics practices they laid more focus on reverse logistics.

Local studies by Ongombe (2012) found that firms that practiced reverse logistics were able to cut costs more than their competitors making them more competitive. However, this study did not address the issue of profitability and reverse logistics practices. Serut (2013) concluded that reverse logistics had a positive and significant impact on performance of manufacturing firms. In his study, Kabuga (2012) found that the critical barriers that affected implementation of lean procurement methodologies of large-scale manufacturing firms included lack of system thinking, resistance to change, poor planning, lack of adequate resource, lack of skills and expertise and the lack of clarity supply chain waste. However, this study did not address reverse logistics practices and it was limited to lean supply chain in manufacturing firms. Therefore, this study attempts to answer the following research questions: what are the reverse logistics practices used by large scale manufacturing firms in Nairobi, Kenya? What is the relationship between reverse logistics practices and profitability of large scale manufacturing firms in Nairobi, Kenya?

1.3 Objective of the Study

The objectives of this study were:

i. To determine reverse logistics practices used by large scale manufacturing firms in Nairobi, Kenya

ii. To establish the relationship between reverse logistics practices and profitability of large scale manufacturing firms in Nairobi, Kenya.

1.4 Value of the Study

This study is mirrored in a way that will bring forth a clear understanding of best reverse logistics practices which augments profitability in manufacturing firms in Kenya. The study will be useful to members of the Kenya Association of Manufacturers with regard to how they can tailor their strategies to go green and increase firm's profitability. This would enable them take advantage of the changing ecological factors in their environment.

NEMA, UNEP and the Council for Logistics are key partners in fostering reverse logistics practices; this study will play a pivotal role in advocacy and ensuring that manufacturing firms in Kenya fully comply with reverse logistics practices to increase their profitability as well as conserve the environment.

The government is one important partner in policy setting; the findings of this study hopes to provide a clear reflection of reverse logistics practices used by manufacturing firms in Kenya. Therefore, the government can set policies that encourage all manufacturing firms to practice RL practices that are profitable.

This study will serve as a point of reference on the relationship between reverse logistics and profitability of firms especially with regard to the contemporary green revolution and preservation of the environment. Researchers and academicians interested in this field of study or other related topics may use the findings of this study as a basis for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section covers the reverse logistics practices used by manufacturing firms; it shows the relationship between reverse logistics practices and profitability of firms and the conceptual argument.

2.2 Reverse Logistics Practices

Most of the supply chain management (SCM) research focuses on the forward flow that transforms raw materials to final products, from suppliers to end customers (Petersen and Kumar, 2010).The reverse material movement from end customers to suppliers has received much less attention (Tibben-Lembke, 2002).According to the Reverse Logistics Executive Council (Reverse Logistics Executive Council, 2007), reverse logistics (RL) is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal". It is now believed that RL as a field is "unique enough to undergo specialized research" (Tibben-Lembke and Rogers, 2002).

Managing reverse logistics is becoming an important component of supply chain management and, in some cases, a profit generating function. Economic and supply chain issues related to reverse logistics are examined, and a working definition of reverse logistics is developed (Knemeyer et al., 2002). In some cases, reverse logistics can even be strategic. Good reverse logistics practices can make a firm more

competitive by reducing the customer's risk when buying a product, because the customer knows that the product can be returned easily. It is clear that most customers prefer reduced risk and will include consideration of transaction risk when selecting a supplier.

Reverse logistics helps the firm to be more agile. Most firms have inventory that does not sell as well as expected. If they can quickly disposition this material, and perhaps even receive some of its cost back, their ability to be successful in the marketplace increases (Jack, Powers and Skinner, 2010).There exist various reverse logistics practices which are adopted by firms to recover lost profits. This study will be guided by the six main revere logistics practices commonly practiced by manufacturing firms to increase their profits. These practices are: customer support, top-management support, communication, costs, formalization, timing of operations, and environmental issues (Kulp et al., 2004).

2.2.1 Remanufacturing Practices

Remanufacturing is a form of reverse logistics practice that uses an industrial process where used products are restored (remanufactured) back to useful life. In remanufacturing, a firm collects all used products from the customers, and thus the timing and quality of the used products are usually unknown. Generally, remanufacturing firms collect used products to improve on their efficiency or usability after which they are resold back to consumers. Since the consumers are required to return these used products, they require certain incentives. As such, some firms resort to buying used products at a cheaper price (Automotive Parts Rebuilders Association (APRA), (Barman, Hanna and LaForge, 2001).

The process of remanufacturing is beneficial to remanufacturing firms in a number of ways. For one, remanufacturing firms are not required to produce new products from scratch. This means that there is a huge cut down on the costs of generating raw materials to make new products. In fact, the cost of raw materials for many such firms is reduced by over 70 per cent (Barnes, 2010).Since the consumers are expected to return used and faulty products to the remanufacturing firm, the process saves the firm almost all its transport costs.

Transport costs are a major barrier to profit maximization which is the main objective of the firm. For remanufacturing firms, transport costs are only incurred while transporting remanufactured products back to the consumer. Remanufacturing firms also benefit from avoiding the need for reducing adverse effects for products that are harmful to the environment. Such firms are among the largest in the world, they are required to either abate adverse environmental effects or compensate the public with huge amounts of money for the same effect. At the same time, due to the fact that such firms reduce their respective environmental impacts, they inherently appear responsible and sensitive. The huge cut-downs on production costs have a positive effect on the ability of a firm to afford modern technology these firms are able to add new features such us rebranding and repackaging. This ensures that the newly reproduced products are of better quality and more appealing to consumers. This in turn increases sales which translate to large amounts of profits leading to increased customer satisfaction. Through remanufacturing firms are able to produce a large variety of products in the market within a short period of time. Remanufacturing practices enable manufacturing firms to achieve an efficient supply chain network that

is able to save costs and delivery quality products to customers (Corbett and Kirsch, 2009).

2.2.2 Recycling Practices

Recycling is a form of reverse logistics practice that is done on products that are not reusable. It is a process where a recycling firm collects non-reusable or destroyed products from the consumer with the aim of entirely modifying them again into new products either of same kind or of different form. Examples of reusable products include parts of metallic or plastic materials. However, not all materials are recyclable, recycling firms select the materials of interest and which are recyclable and destroy or landfill the rest. The difference between recycling and remanufacturing practices is that the recycled products are not usable and it is not a must that the end product must be of the original form or utility. In other words, the materials from the products to be recycled become raw materials to produce other products (De Brito and Dekker, 2003).

Like remanufacturing, there are various advantages of recycling as a reverse logistics practice. Recycling enables firms to reduce the cost of generating of raw materials for production. Although the recycling firms manufacture their products from scratch, research has proved a huge difference between the costs of natural generation of raw materials and costs of generating raw materials by way of recycling. Recycling firms may buy destroyed or non-reusable products with materials of interest from consumers of the public which they recycle to make completely new products which are sold at multifold prices. While most recyclable materials are non-biodegradable, it goes without saying that recycling firms save the environment from potential deterioration (Fawcett, Vellenga and Truitt, 1995).

Such firms remove millions of tons of non-biodegradable wastes from the surroundings. Some firms opt to pay recycling firms to recycle their destroyed products. If a firm recycles its products, it is not worth mentioning that such a firm nets huge amounts of returns and greatly abate its environmental pollution. Recycling is considered 'green' reverse logistics practice; it is a cheaper process of generating raw materials to ensure that the firm is able to produce more products and thus satisfy the market in terms of mainstreaming and sustaining its supply chain (Fleischmann and Kuik, 2003).

2.2.3 Repackaging Practices

Packaging is a type of reverse logistics practice that involves repackaging reselling the same products to consumers. Mostly this happens if the first packaging has been damaged beyond salable attractiveness. Sometimes, products packaging may be damaged during transportation to the market or when products and services are wrongly packaged at the manufacturing firm before transportation to the market. Such products are recalled for repackaging. Consumers are expected to return wrongly packaged products or product with damaged packaging back to the manufacturer (Guide and Van Wassenhove, 2011).

There are a number of reasons for a manufacturing firm to resort to repackaging. First is the fact that, like in remanufacturing, repackaging is much more preferable to manufacturing new products from scratch. The idea is that the quality of the product is still intact and only packaging has been destroyed or disfigured. Therefore, it is easier and economically sound for a firm to repackage the product and resend it to the market. As the consumer or the distributor has the responsibility to return the product for repackaging to the manufacturing firm, such a firm is saved the agony of transport

costs. Therefore, repackaging becomes economically feasible (Hazen, Hall and Hanna, 2012).

Then there is the image and popularity of the manufacturing firm that must be kept intact if the manufacturing firm is to remain buoyant in the business. By repackaging, such a firm portrays high levels of responsibility and care for the end users (Hazen, 2011). This way, more and more consumers confide in the firm and its products and such levels of responsibility proportionately increase consumer base and thus sales and profits. In the meantime, a lot of time is saved which could have otherwise be used in manufacturing a new product from scratch and disposing off the unsellable product. By simply substituting a properly packaged product for the wrongly packaged or destroying unsellable product, the supply chain is minimally affected. If anything, the supply chain for such a product remains intact which is the prime goal of almost all manufacturing firms (Carter & Ellram, 1998).

2.2.4 Landfill Practices

Land fill is a site for the disposal of waste materials by burial and is the oldest form of waste treatment. Some landfill are also used for waste management purposes, it a form of reverse logistic practice used by most manufacturing firms to get rid of waste products. Facilities that achieve a zero-landfill goal literally send less waste to a landfill than a single household does (Mukhopadhyay, and Setoputro, 2004). Considering a firm that releases massive amounts of wastes, landfills are beneficial to the maiden firm in many ways. For one, landfills massively reduce the cost handling and transportation of wastes. In this case, although there is the requirements of a local space enough for waste disposal, comparatively, dumping wastes in a landfill is

cheaper than hiring a waste collector especially when it comes to large amounts of waste (Malone, 2004).

Similarly, it is cheaper and more environmentally ethical to use landfills than incinerating large amounts of wastes. While most wastes that disposed in a landfill are unusable or non-recyclable, the most convenient and cost-effective means of disposing such waste is using a landfill. When it comes to biodegradable waste, landfills can turn into a goldmine. Recent studies have shown that massive amounts of energy can be tapped from landfill gases. Firms owning such landfills may counter any costs undergone during waste disposal with the profits gains from sales of landfill gas energy (Jensen and Webster, 2009).

Firms that produce toxic wastes often are concede the environmental responsibility to ensure that such waste does not come into contact with the environment and the public altogether. Such firms conveniently resort to burying toxic wastes deep in the ground. Depending on the working environmental or public health safety policy, a firm that does not conform to such a policy becomes culpable and may lose not only the abating cost; it may also lose production licensing. In cases where enough space is not available, landfills may become a threat economically because firms may be required to buy more land to create disposal space. This can lead to massive economic adversities that any firm may not be able to manage (Markley and Davis, 2007).

2.2.5 Reverse Engineering Practices

Reverse engineering is part of reverse logistics practice that is achieved through examining a competitor's product in order to identify opportunities for product improvement and cost reduction. The competitor's product is dismantled to identify

its functionality and design and to provide insights about the processes that are used and the cost to make the product. The aim is to benchmark provisional product designs with the designs of competitors and to incorporate any observed relative advantages of the competitor's approach to product design. Firms that practice reverse engineering might aim at producing a copy of the same product with some improvements (Stank, Emmelhainz and Daugherty, 1996).

With an improved product, reverse engineering helps competitor to outweigh a pre-existing firm in a particular industry. Depending on the firm in question, a firm that fosters reverse engineering may more or less aim at completely removing a competitor from the market. Defeating the product may also be the main aim such a product may be in existing threat to the functionality of a particular firm and therefore it has to be defeated in some way. In the computer industry, for example, a company under the threat of any kind of a malware will try to study such a malware in order to dismantle its protection mechanisms (Stank, Keller, Daugherty, 2001).

Reverse logistics has many advantages, for example, if a firm practices reverse engineering for the purposes of removing production threat, after success in this context, such a firm will be able to produce more and more products and therefore satisfy the market in terms of supply. This is of critical significance especially when it comes to sustenance of supply chain in a particular industry. It is also very significant move for stiffening competitive index. When a firm does reverse engineering for the purpose of improving the product and thus outweighing competitors, upon success, such a firm attains a more competitive stance, manipulates the market dynamics to its advantage and gains more profits. In one way or another, this means increased revenue, capital base and hence stability (Stock and Mulki, 2009).

Although reverse engineering may prove an exceptional tool for competitiveness and profitability, a firm that practices it must be very careful. The reason behind this is that there might erupt various complains and conflicts related to copyright infringement, there has been so many court cases on contestation of copyright infringement whereof a firm may stand to massively lose in economically and professionally. All in all, successful reverse engineering is all-round beneficial (Zhu and Sarkis, 2007).

2.3 The relationship between Reverse Logistics Practices and Profitability of Firms

Every firm is most concerned with its profitability, one of the most frequently used tools of financial ratio analysis is profitability ratios which are used to determine the company's bottom line and its return to its investors (Jensen and Webster, 2009).Profitability measures are important to company managers and owners especially in determining the financial performance of a firm and decision making. Profitability ratios show a firm's overall efficiency and performance. Profitability ratios can be divided into two types: margins and returns. Ratios that show margins represent the firm's ability to translate sales dollars into profits at various stages of measurement. Ratios that show returns represent the firm's ability to measure the overall efficiency of the firm in generating returns for its shareholders (Lim and Lovell, 2009).

Reverse logistics practices highly contributes to profitability of firms; previously most firms especially manufacturing firms lost a lot of profits. Today, reveres logistics is seen by most firms as a way of recovering lost profits. Okoli and Pawlowski (2004), profitability analysis is an important means of assessing logistics activities and

proposed changes to a firm's logistical systems (Richey, Genchev and Daugherty, 2005).

Profitability analysis goes beyond total cost analysis by incorporating the revenue impact of logistical activities. For example, an improved level of service may bring about increased revenue as your customers respond to your higher levels of service. Such changes must be built into logistical system analysis. Additionally, the impact of assets such as inventory levels, accounts receivable and fixed logistical assets should be incorporated into a comprehensive profitability analysis approach (Mueller, 1990).

Critical reverse logistics functions can cost companies millions in lost profits due to damaged customer relationships and external liabilities that could have an enormous impact on their business. Effectively managed, however, reverse logistics can enable organizations to find hidden profits, improve customer satisfaction and minimize liabilities. Fleischmann and Kuik (2003), is that the average manufacturer will spend 9% to 15% of total revenue on returns, according to a 2010 Aberdeen Group study. They are often unaware of the impact returns management can have on their customers, their resources or their bottom line. In fact, improving reverse logistics can help company increase revenue up to 5% of total sales (Mukhopadhyay and Setoputro, 2004).

Reverse logistics practices play an integral role of recapturing the value of returned products or properly disposing of them. An opportunity with this order of magnitude has instigated many companies to push the boundaries of integrated reverse logistics practices to find new ways to streamline operations, drive profits, and delight customers. On top of that, some forward thinking companies have created new lines of revenue through their expertise in providing integrated reverse logistics services

that cut through the barriers (Mollenkopf et al., 2007). Fawcett et al.,(1995) arugue that reverse logistics can include gaining feedback to make improvements and to improve the understanding of real reasons for product return, this play an important role in the growth of an organization leading to financial, environmental and societal gains.

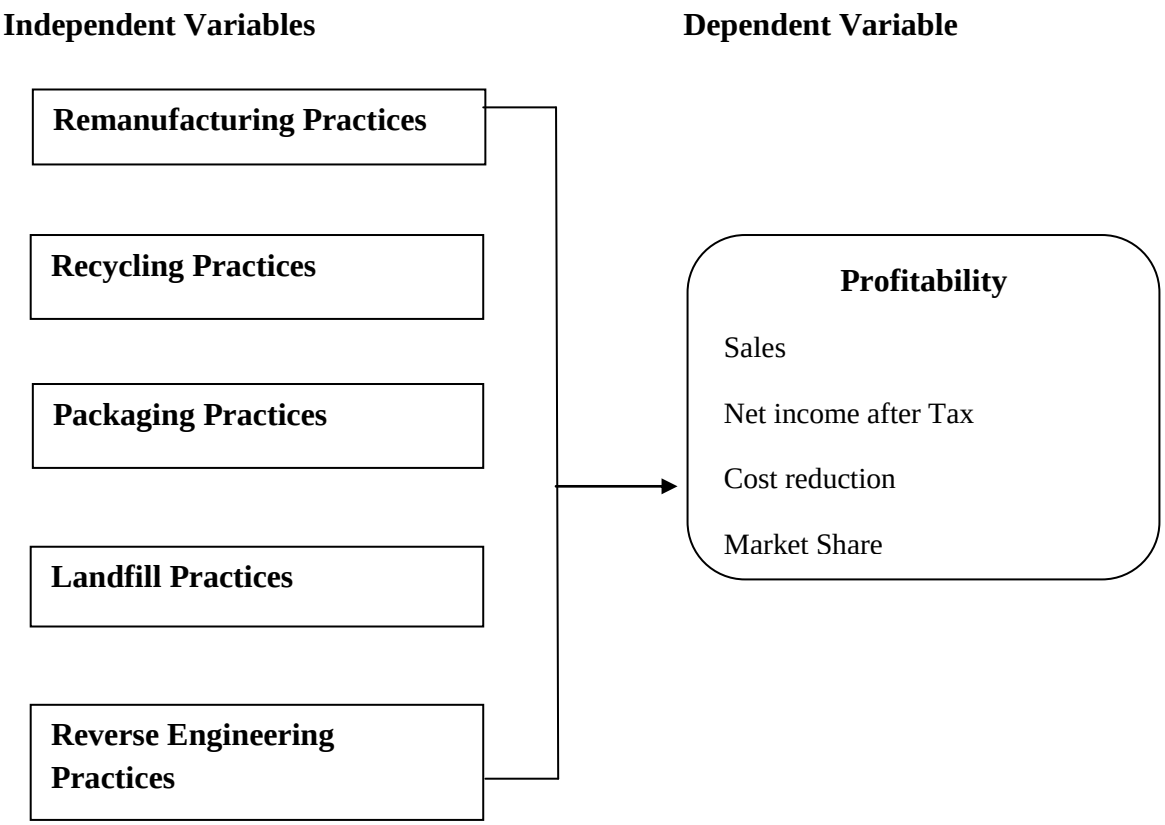
2.4 Summary of the Literature Review and Knowledge Gap

Review of empirical literature. The empirical literature encompasses the need for reverse logistics practices and how it influences profitability of manufacturing firms in Kenya. Previous studies by Ongombe (2012) and Serut (2013) laid more focus on reverse logistics and performance; the studies did not address issues of reverse logistics practices and profitability of manufacturing firms in Kenya. This study therefore finds it necessary to address this gap by determining reverse logistics practices used by manufacturing firms in Kenya and the relationship between reverse logistics and profitability of manufacturing firms in Kenya. Reverse logistics practices is one of the ways in which manufacturing firms can use to increase their profitability through making maximum use of their waste products and materials to produce value added goods and services at a reduced cost which in return will lead to improved customer satisfaction.

2.5 Conceptual Framework

From the basis of this study, the independent variables affect the dependent variable, which is profitability of manufacturing firms in Kenya. To this extent therefore, increase in profitability in manufacturing firms in Kenya depends on how effective the manufacturing firms implement reverse logistics practices. The researcher used a conceptual model indicated below to explain the reverse logistics practices and how

they lead to an increase in profitability of manufacturing firms in Kenya. Below is a conceptual representation of this argument.



Source: (Author, 2014)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the proposed research design, the target population, sampling design, data collection instruments and procedures, and the techniques for data analysis.

3.2 Research Design

A descriptive survey design was used for this study. With such a study, information will be obtained to meet the underlying purposes and objectives of the study. Descriptive survey was useful in investigating the existing relationships among the variables that was captured in this study. According to Cooper & Emory (1995), a survey is feasible when the population is small and variable hence the researcher will be able to cover all the elements of the population. Hence the survey was considered to be more efficient and economical.

3.3 Population of the Study

The population of the study included all large scale manufacturing firms in Nairobi, Kenya. According to the Kenya Association of Manufacturers (2013), there are 455 large scale manufacturing firms in Nairobi. The study considered Nairobi because this is where most of the large scale manufacturing firms in various sectors are concentrated and thus providing a population where a proportionate sample could be derived. Large scale manufacturing firms generate a lot of waste materials.

3.4 Sample Design

The sample size for this study involved 46 respondents. This was arrived at through a formula developed by Kelley and Maxwell (2003) as shown below: 0.101=Sample Size/Total population (0.101*455) =46.This formula was derived from a series of samples assuming non zero probability. This method was considered appropriate when using a descriptive survey research design and a regression model as recommended by (Kelley and Maxwell, 2003).The study used a stratified sampling approach to determine the sample of the study provided in Appendix II of this study.

3.5 Data Collection

The study used primary and secondary data that was collected through a self-administered questionnaire designed to elicit specific responses for qualitative and quantitative analysis respectively. The researcher conducted a cross sectional study on the reveres logistics practices used by large scale manufacturing firms in Kenya. Secondary data was obtained from audited financial statements from Kenya Association of Manufacturers.

The questionnaires had two sections. The first section contained questions on the fist objective of this study which is to determine the reverse logistics practices used by manufacturing firms in Kenya, and the second part of the questionnaire contained questions on the second objective of the study which was establishing the relationship between reverse logistics and profitability of manufacturing firms in Kenya.

The respondents for this study were the heads of purchasing or Procurement or supply Chain department and management officers in charge of materials management of the firms or their equivalents. This is because the heads of supply chain department were deemed to be familiar with the reverse logistics practices used by large scale

manufacturing firms. The questionnaires were administered by a drop and pick later method at an agreed time with the researcher.

3.6 Data Analysis

The data collected was analyzed using descriptive statistics which involved mean and standard deviation to achieve the first objective of the study. To achieve objective two of the study, data was analyzed using a regression model. The regression model was used for establishing the relationship between reverse logistics practices and profitability of large scale manufacturing firms in Kenya. The model adopted consisted of five variables: The independent variables were the reverse logistics practices while the dependent variable was profitability of large scale manufacturing firms.

$$\mathbf{Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + e}$$

Y_F= profitability of large scale manufacturing firms

$\mathbf{X_1}$=Remanufacturing

$\mathbf{X_2}$=Recycling Practices

$\mathbf{X_3}$=Packaging Practices

$\mathbf{X_4}$=Landfill Practices

$\mathbf{X_5}$=Reverse Engineering Practices

€= Error term.

The study used a multiple regression model to show the relationship between reverse logistics practices and profitability of large scale manufacturing firms in Nairobi, Kenya. Effective implementation of reverse logistics practices led to profitability of large scale manufacturing firms in Kenya.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This section gives the presentation of the analyzed data and the findings obtained from the primary data that was assembled from the respondents. Secondary data for 2013 was accessed on the specific components of firm profitability. In order to check for accuracy, consistency and completeness, all questions that had been responded were cross-checked to ensure that they were done well.

4.2 Response Rate

The researcher targeted heads of supply chain from large scale manufacturing firms that were largely involved in matters of reverse logistics and waste management. The response of the questionnaires that were delivered and completed by the respondents was 32 out of 46. This represented 70% response which was considered a satisfactory representation of the whole population.

4.3 Reverse Logistics Practices

To achieve the first objective of this study, the study determined the various reverse logistics practices used by large scale manufacturing firms in Nairobi, Kenya using a five point likert scale. Next are the results of the findings:

4.3.1 Remanufacturing Practices

The study sought to determine the remanufacturing practices used by large scale manufacturing firms in Nairobi, Kenya. This was intended to determine the extent to

which large scale manufacturing firms implemented remanufacturing practices. Next are the results of the findings:

Table 4.1 Remanufacturing Practices

Remanufacturing Practices	N	Mean	Std. Deviation
The manufacturing firms saves transport costs and costs of purchasing raw materials	32	3.37	.707
The manufacturing firms collect used products from customers to make new products	32	3.16	.723
The manufacturing firm has agility through implementation of a good reverse logistics	32	3.16	.808
Manufacturing firms buy used products from customers at a cheaper price	32	3.03	.740
Manufacturing firms strategically plan for reverse logistic	32	2.94	.716
Customers took substandard products to the firms for remanufacturing.	32	2.91	.390
Manufacturing firms effectively managed waste products for remanufacturing	32	2.50	.508
Manufacturing firms preserve the environment	32	2.31	.859
Valid N (listwise)	32		

Source: Field Work (2014)

From the above findings, it was observed that most large scale manufacturing firms saved transport costs and costs of purchasing raw materials, most manufacturing firms collected used products from customers to make new products. Conversely, the results showed that the manufacturing firm has agility through implementation of a good reverse logistics. It was further observed that manufacturing firms buy used products from customers at a cheaper price. These remanufacturing practices scored mean scores as follows: 3.37, 3.16, 3.16 and 3.03. From the above findings, most large

scale manufacturing firms implemented remanufacturing practices through used products that underwent further processes to achieve more value adding goods and services.

Similarly, the analysis revealed that most manufacturing firms did not practice remanufacturing practices for purposes of environment conservation but profitability. This attained a mean score of 2.31 with a standard deviation of .859.

4.3.2 Recycling Practices

The study determined the recycling practices used by large-scale manufacturing firms in Kenya with the objective of entirely modifying waste products into a new product either of the same kind or of a different form. Below are the results of the findings provided in the table 4.2 below:

Table 4.2 Recycling Practices

Recycling Practices	N	Mean	Std. Deviation
The manufacturing firms save the environment from potential deterioration.	32	3.16	.767
The manufacturing firms collect used products from customer with the aim of entirely modifying them again	32	2.94	.759
The manufacturing firms are able to produce more products and thus satisfy the market in terms of mainstreaming and sustaining its supply chain	32	2.84	.628
Manufacturing firms use the products to be recycled as raw materials to produce other product	32	2.56	.504
Manufacturing firms hires a recycling firm to recycle its products	32	2.37	.492
Valid N (listwise)	32		

Source: Field Data (2014)

From the findings, it was revealed that most manufacturing firms saved the environment from potential deterioration; the results further revealed that most manufacturing firms collected used products from customer with the aim of entirely modifying them again. This is represented by mean scores of 3.16 and 2.84. It was also found that most large scale manufacturing firms' were able to produce more products and thus satisfy the market in terms of mainstreaming and sustaining its supply chain, this attained a mean score of 2.84.

On the other hand, the findings unearthed that only a few manufacturing firms hired a recycling firm to recycle their products. This attained a mean score of 2.37 with a standard deviation of .492

4.3.3 Repackaging Practices

The study determined the extent to which large scale manufacturing firms implemented repackaging practices for damaged products during transportation or when products and services were wrongly packaged at the manufacturing firm. Below are the results of the findings presented in table 4.3 below:

Table 4.3 Repackaging Practices

Repackaging Practices	N	Mean	Std. Deviation
The distributor returns the product for repackaging to the manufacturing firm and thus the firm is able to save transport costs	32	3.59	.499
The manufacturing firms repackage the product and resend the same product to the market	32	2.56	.718
The manufacturing firm repackage and resale product from the customers increasing their profitability.	32	2.56	.504
The manufacturing firms repackage their products to increase market share and sales and profit	32	2.19	.644
Through repackaging the manufacturing firm is able to portray a high levels of responsibility and care for the end-users	32	1.97	.595
Valid N (listwise)	32		

Source: Field Data (2014)

From the above findings, the results were as follows: The distributors returned the product for repackaging to the manufacturing firm and thus the firm is able to save transport costs. It was further revealed that most distributors of large scale manufacturing firms returned the products for repackaging to the manufacturing firm and thus the firms were able to save transport costs. These results are represented by mean scores of 3.59 and 2.56. It was also discovered that the manufacturing firm repackage and resale product from the customers increasing their profitability. This attained a mean score of 2.56.

Further the analysis discovered that most large scale manufacturing firms did not implement repackaging practices in order to portray a high level of responsibility and care for the end users of large scale manufacturing firms in Nairobi, Kenya. This was represented by a mean of 1.97 with a standard deviation of .595.

4.3.4 Landfill Practices

The study reviewed the extent to which large scale manufacturing firms implemented land fill practices as way of disposal of waste materials by burial as a form of waste treatment. Below are the results of the findings as provided in the table 4.4 below:

Table 4.4 Landfill Practices

	N	Mean	Std. Deviation
The manufacturing firm use landfills to comply with the environmental and health policies.	32	3.66	.483
The manufacturing firm have landfill sites for waste management purposes	32	3.63	.492
Manufacturing firms incur less costs as compared to hiring a waste collector	32	3.47	.507
Manufacturing firm tap massive amounts of energy from landfill gases	32	2.09	.689
The Manufacturing firm has a landfill for purposes of waste management	32	2.03	.822
Valid N (listwise)	32		

Source: Field Data (2014)

According to the findings, it was revealed that the manufacturing firm used landfills to comply with the environmental and health policies. It was also found the manufacturing firm has landfill sites for waste management purposes similarly, the

results revealed that Manufacturing firms incurred less costs as compared to hiring a waste collector. These results as follows: mean scores of 3.66, 3.63 and 3.47.

The findings observed that most large scale manufacturing firms did not tap massive amounts of energy from landfill gases. The findings also confirmed that most large-scale manufacturing firms did not retain a landfill for waste management purposes only. These mean scores were as follows: 2.09 and 3.03 with standard deviations of .689 and .822.

4.3.5 Reverse Engineering Practices

The researcher examined the extent to which reverse engineering practices were implemented in large scale manufacturing firms to achieve product improvement and cost reduction. Below are the results of the findings.

Table 4.5 Reverse Engineering Practices

	N	Mean	Std. Deviation
The manufacturing firm implement reverse engineering to enhance competitive advantage and increase profitability	32	3.56	.504
Manufacturing firms examine a competitors product in order to identify opportunities for product improvement and cost reduction	32	3.34	.545
The manufacturing firm use reverse reengineering to benchmark their products design with that of the competitors	32	3.22	.659
Manufacturing firms produce value added goods and services	32	2.84	.767
Manufacturing firms is able to achieve efficiency in their operations	32	2.84	.767
The manufacturing firm is involved in copyright infringement court cases.	32	1.13	.336
Valid N (listwise)	32		

Source: Field Data (2014)

From the findings, it was revealed that most large scale manufacturing firms implemented reverse engineering to enhance competitive advantage and increased profitability with a mean score of 3.56. The findings also revealed that the manufacturing firms examined a competitor's product in order to identify opportunities for product improvement and cost reduction, its mean score was 3.34

Further, the analysis discovered that most manufacturing firms were able to produce value added goods and services and increased efficiency in their operations. This was represented by tie in mean scores of 2.84 and 2.84.

Further, the analysis discovered that only a few large scale manufacturing firms that were involved in copy right infringement and court cases with a mean score of only 1.13 and standard deviation of .336.This was an indication that most large scale manufacturing firms were not involved in copyright infringement court cases. Quite a number of large scale manufacturing firms benchmarked their products design with that of the competitors.

4.5 The Relationship between Reverse Logistics Practices and Profitability of Large-Scale Manufacturing Firms in Nairobi, Kenya

To achieve the second objective of this study which was to establish the relationship between reverse logistics practices and profitability of large scale manufacturing firms this study used a regression analysis model as provided below:

4.5.1 Regression Analysis

The regression analysis was used to establish the relationship between reverse logistics practices and profitability of large scale manufacturing firms. The reverse

logistics practices were used as the independent variables while the dependent variable was profitability of the firm.

4.5.2 Model Summary

The model summary was used to determine the correlation (R) between reverse logistics practices and the firm profitability. The coefficient of determination (R^2) was used to determine whether model was a good predictor in establishing the relationship between the variables. Next are the results of the findings in table 4.6 below:

Table 4.6 Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724[a]	.524	.502	.120

a. Predictors: (Constant), Reverse Engineering Practices, Remanufacturing Practices , Repackaging Practices, Recycling Practices, Landfill Practices

The findings reveal that 52% of the variation in profitability was explained by the variables in the model. This implies that regression model adopted for this study was a satisfactory predictor.

4.5 3 Analysis of Variance

Analysis of variance was used to test the homogeneity of the variance between reverse logistics practices and profitability of large-scale manufacturing firms. Next are the results of the findings provided in table 4.7 below:

Table 4.7 Analysis of Variance

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51.442	5	10.288	12.686	.020[b]
	Residual	21.079	26	.811		
	Total	72.521	31			

a. Dependent Variable: Profitability

b. Predictors: (Constant), Reverse Engineering Practices, Remanufacturing Practices , Repackaging Practices, Recycling Practices, Landfill Practices

From the findings, it was discovered that the p-value=0.020 which is less than 5%.This means that the model was statically significant in predicting the relationship between reverse logistics practices and profitability of large-scale manufacturing firms at 5% level of significance.

4.5.4 Tests of Coefficients

The researcher determined the statistical significance between reverse logistics practices and profitability of large-scale manufacturing firms. Below are the results of the statistical tests carried out by determining whether the mean difference is significant at 5% level.

Table 4.8 Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.201	3.519		-2.759	.010
	Remanufacturing Practices	.102	.221	.154	.201	.016
	Recycling Practices	.615	.313	.568	4.234	.020
	Repackaging Practices	.316	.369	.102	1.102	.018
	Landfill Practices	1.012	.402	.307	3.519	.036
	Reverse Engineering Practices	.158	1.651	.140	.207	.001

a. Dependent Variable: Profitability

Next is the regression model that was obtained from the results of the analysis below:

Profitability of the firm = $-1.201+.102X_1+.615X_2+.316X_3+1.012X_4+.158X_5$

From the results, the p-values obtained were as follows: p=0.016, p=0.020, p=0.018, p=0.036 and p=0.001. Since the p-values were less than 5%, this means that the relationship between the variables was statistically significant since the p-values of all the independent variables from the table were less than 5%.The regression analysis found that there was a direct relationship between the variables. This means that holding all other factors constant a unit increase in one of the independent variables results into a corresponding increase in the dependent variable (profitability of firms).

4.6 Chapter Summary and Discussion

The findings revealed that the most popular reverse logistics practices implemented by large scale manufacturing firms were recycling, repackaging, landfill practices and remanufacturing practices. These practices were implemented to a large extent since they were deemed to highly contribute to profitability of large scale manufacturing firms. According to the findings, the results of the descriptive statistics reveal that most manufacturing firms adopted reverse logistics practices to achieve reduced costs in their operations: purchasing costs of raw materials, holding costs, transport cost, stock out costs. This is supported by the following findings; most large scale manufacturing firms implemented effective management of waste products for remanufacturing, the manufacturing firms saved transport costs and costs of purchasing raw materials, firms collected used products from customers to make new products, Customers took substandard products to the firms for remanufacturing.

The results of the regression analysis revealed that there was a direct relationship between reverse logistics practices and profitability of large scale manufacturing firms. From the results, 52.4 % explains the variance on the effect of reverse logistics practices on profitability of large scale manufacturing firms. From the tests, there was statistically significant relationship between the variables since the p-values of all the independent variables from the table above are less than 5%. These results are however consistent with a study that was carried out by Huscroft, Dianne and Hanna (2013), who adopted a regression model in data analysis and the results found that there was a direct relationship between reverse logistics and profitability of manufacturing firms since the p-values obtained were less than 5%. The study concluded that reveres logistics was an important tool in enhancing profitability of manufacturing firms. Similarly, Rogers et al (1999) concluded that operating expenses can be reduced through effective and innovative returns management programs. In addition to minimizing costs relative to returns processing, customer service costs can be reduced if the return process is streamlined from a customer's perspective.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND DISCUSSION

5.1 Introduction

The aim of the study was to determine the reverse logistics practices used by large scale manufacturing firms in Nairobi Kenya and to establish the effect of reverse logistics practices on profitability of large scale manufacturing firms in Nairobi County. This section therefore covers: the summary of the findings and discussions, conclusion, recommendation, limitations and suggestions for further study.

5.2 Summary of Findings

According to the findings, the researcher targeted heads of supply chain from large scale manufacturing firms that were largely involved in matters of reverse logistics and waste management. The response of the questionnaires that were delivered and completed by the respondents was 32 out of 46. These remanufacturing practices scored mean scores as follows: 2.50, 3.37, 3.16 and 2.91. From the above findings, most large scale manufacturing firms implemented remanufacturing practices through used products that underwent further processes to achieve more value adding goods and services.

It was revealed that most manufacturing firms saved the environment from potential deterioration; the results further revealed that most manufacturing firms were able to save the environment from potential deterioration. This is represented by mean scores of 3.16 and 2.84.It was further revealed that most large scale manufacturing firms collected used products from customer with the aim of entirely modifying them again, this attained a mean score of 2.94.Similarly, the analysis revealed that reverse

logistics plan was not part of a key activity in the implementation of remanufacturing practice among large-scale manufacturing firms in Kenya.

From the findings, the results were as follows: most large scale manufacturing firms repackage and resell their products from the customers and hence increasing their profitability. It was further revealed that most distributors of large scale manufacturing firms returned the products for repackaging to the manufacturing firm and thus the firms were able to save transport costs. These results are represented by mean scores of 3.59 and 4.56. It was also discovered that manufacturing firms repackaged the products and resend the same product to the market; this attained a mean score of 2.53.

Further the analysis discovered that most large scale manufacturing firms did not implement repackaging practices in order to portray a high level of responsibility and care for the end users of large scale manufacturing firms in Nairobi, Kenya. This was represented by a mean of 2.97.

It was also discovered that most large scale manufacturing firms had a landfill sites for waste management purposes. It was also found that most large scale manufacturing firms used landfills to comply with the environmental and health policies. These results as follows: mean scores of 3.63 and 3.66.

The findings observed that most large scale manufacturing firms did not tap massive amounts of energy from landfill gases. The findings also confirmed that most large-scale manufacturing firms did not retain a landfill for waste management purposes only. This was attained with mean score of 2.09 and 3.03 with a standard deviation of .689 and .822

Further, the analysis discovered that only a few large scale manufacturing firms that were involved in copy right infringement and court cases with a mean score of only 1.13 and standard deviation of .336.This was an indication that most large scale manufacturing firms were not involved in copyright infringement court cases. Quite a number of large scale manufacturing firms benchmarked their products design with that of the competitors.

The results of the regression analysis revealed that there was a direct relationship between reverse logistics practices and profitability of large scale manufacturing firms. From the results, (R^2 = 52.4), 52.4 % explains the variance on the effect of reverse logistics practices on profitability of large scale manufacturing firms. From the tests, there was statistically significant relationship between the variables since the p-values of all the independent variables from the table above are less than 5%.

5.3 Conclusions

The level of reverse logistics adoption by large scale manufacturing firms in Kenya is moderate. From the analysis, it is evident that the level of investment, resources and overall commitment towards reverse logistics are quite average. It shows that firms are not really ready to commit themselves towards investing and allocating extra resources for reverse logistics adoption this is explained by the extent of implementation of reverse logistics practices adopted by large scale manufacturing firms from the above findings.

As a conclusion, the findings of this study have indicated that reverse logistics adoption among large scale manufacturers is still low. This is mainly due to the lack of awareness or knowledge on the reverse logistics concept. Although management of

the firms realizes the benefit of reverse logistics, the level of investment, resource allocation and commitment towards it is still low. The study therefore concludes that the most popular reverse logistics activities implemented by most firms involve receiving the returned product from customers. This is because the findings confirmed that the number of manufacturers that used other activities such as remanufacturing, reconditioning, landfill practices and repackaging was quite high.

5.4 Recommendations

Reverse logistics adoption can be associated with the barriers of adoption question, where lack of awareness or knowledge on reverse logistics scores the highest among all the other barriers. Furthermore, manufacturers have the perception that reverse logistics require a huge investment and high number of resources this could make the manufacturers reluctant to invest and allocate resources even though the management of the company is aware of the benefit of adopting reverse logistics. The study therefore recommends that firms should commit themselves and invest in IT infrastructure to effectively implement and deliberate reverse logistics practices.

The study further recommends that firms should adopt reverse logistics since it is expected to create new products or even improve their current product, improve the relationships with its customers and enhance firm's competitive advantage. It is also important nowadays for manufacturers to enhance its corporate social responsibility and reverse logistics is one of the best ways to boost their credibility and prestige in the eyes of the customer.

This study is also important because it represents an attempt to identify the reverse logistics activities that have been implemented by manufacturers and which one are

not. Furthermore, it highlights the most important benefits enjoyed by those firms that have implemented reverse logistics in their operations. This hopefully will encourage manufacturers that have yet to implement reverse logistics activities to seriously consider this practice since it can be beneficial in improving competitiveness and customer service and relationships.

The study also recommends that firms should adopt reverse logistics since it provides the important information for manufacturers, government agencies, policy makers, managers and researchers by highlighting a number of key issues that hinder the implementation of reverse logistics activities among large scale manufacturers in Nairobi, Kenya.

5.5 Limitations

The researcher also faced significant time and funding constraints which limited the scope of the study. It would have been more useful if there was sufficient time to carry out the research on all the large scale manufacturing firms in Nairobi County. This therefore means that the findings of this study cannot be used to make generalization on all the large scale manufacturing firms in Kenya.

5.6 Suggestions for Further Research

Future study may consider investigating the state of adoption within different manufacturing industries as this study focused on large scale manufacturing firms in Nairobi, Kenya only. It is expected that reverse logistics implementation level might depend on the industries that each manufacturing entities are in.

Moreover, it would be a good idea to investigate the influences of various factors such as government regulations, environmental awareness or any other factors either as

independent or moderating mediating variables that can influence manufacturer's decision in adopting reverse logistics activities.

The study proposes the need for investigating on appropriate ways to increase formalization of reverse programs and establish reverse logistics as a profit center within organizations may be the areas in greatest need for additional scholarly research.

A comparative study with another country both in the sub-region, the developed and developing world to ascertain the reverse logistics practices adopted by manufacturing firms and the effect of reverse logistics practices on profitability of manufacturing firms. Then, findings and conclusions can be made based on facts.

REFERENCES

Arman, S., Hanna, D., and LaForge, L. (2001).Perceived Relevance and Quality of POM Journals: A decade later, *Journal of Operations Management*,. 19(3): 367-85

Atasu, A. and Cetinkaya, S. (2006).Lot sizing for Optimal Collection and Use of Remanufacturable Returns Over A finite Life-Cycle, *Production and Operations Management*, 15(4):15

Autry, C. W. (2005),Formalization of Reverse Logistics Programs: A Strategy for Managing Liberalized Returns, *Industrial Marketing Management*, 34(7):749-57

Barman, S., Hanna, D. and LaForge, L. (2001).Perceived Relevance and Quality of POM Journals: a decade later, *Journal of Operations Management*, 19(3):367-385

Barnes, B. (2010). *Returns Management Best Practices and Next Generation Programs Panel Discussion*, Reverse Logistics Association

Barry, J.; Girard, G. & Perras, C. (1993).Logistics Planning Shifts into Reverse. *Journal of European Business*: 5(1): 34-38

Bolo, A. Z., & Wainaina, G. (2011). An Empirical Investigation of Supply Chain Management Best Practices in Large Private Does your organisation in Kenya. *Prime Journal of Business Administration and Management*, *1*(2), 2-3.

Carter, R. and Ellram, .M. (1998). Reverse Logistics: A Review of the Literature and Framework for Future Investigation, *Journal of Business Logistics*, 19(1):85-102.

Chandra, P.(2002). *Financial Management Theory and Practice, Tata Mc Graw Hill Publishing Company Limited*, New Delhi.

Chopra, S. and Meindl, P. (2004). *Supply Chain Management: Strategy, Planning, and Operation, 2nd ed., Pearson Prentice Hall*, Upper Saddle River, NJ

Cooper, A., & Emory, C. W. (1995). *Business research methods*. Chicago: Irwin

Cooper, D. R., & Schindler, P. S. (2003). *Business research methods*. Boston: McGraw-Hill/Irwin.

Corbett, C.J., Kirsch, D.A. (2009).International Diffusion of ISO 14000 Certification, *Production and Operations Management*, 10(3):327-342

Daugherty, J., Richey, G. and Genchev, E., and Chen, H. (2005).Reverse logistics: Superior Performance through focused Resource Commitments to Information Technology, *Transportation Research: Part E*, 41(2):77-92

De Brito, P. and Dekker, R. (2003). *A framework For Reverse Logistics*, Econometric Institute Report EI 2001-38, Erasmus University Rotterdam, the Netherlands

Dowlatshahi, S. (2005). A strategic Framework for the Design and Implementation of Remanufacturing Operations in Reverse Logistics, *International Journal of Production Research*, 43(16): 3455-80.

Dowlatshahi, S. (2012). A Framework for the Role of Warehousing in Reverse Logistics, *International Journal of Production Research*, 50(5):1265-1277

Fawcett, E., Vellenga, B. and Truitt, J. (1995). An Evaluation of Logistics and Transportation Professional Organizations, Programs, and publications, *Journal of Business Logistics*, 16 (1):299-314

Fleischmann, M., and Kuik, R. (2003). On Optimal Inventory Control with Independent Stochastic Item Returns, *European Journal of Operational Research*, 151(1):25-37.

Genchev, E., Richey, G. and Gabler, B. (2011). Evaluating Reverse Logistics Programs: A suggested Process Formalization, *International Journal of Logistics Management*, 22(2): 242-263

Government of Kenya (1994).*National Development Plan 1994–1996*, Government printer, Nairobi.

Guide, Jr, and Van Wassenhove, N. (2011).The Evolution of Closed-Loop Supply Chain Research, *Operations Research*, 57(1):10-18.

Hazen, B.T. (2011).Strategic Reverses Logistics Disposition Decisions: From Theory to Practice, *International Journal of Logistics Systems and Management*, 10(3):275-292.

Hazen, T., Hall, J. and Hanna, B. (2012).Reverse Logistics Disposition Decision-Making: Developing a Decision Framework via Content Analysis, *International Journal of Physical Distribution and Logistics Management*, 42(3):244-274.

Huscroft, J. Dianne, H. and Hanna, J. (2013). Reverse logistics: past research, current management issues, and future directions, *The International Journal of Logistics Management*, 24 (3):304 - 327

Jack, .P. Powers, L. and Skinner, L. (2010).Reverse Logistics Capabilities: Antecedents and Cost Savings, *International Journal of Physical Distribution and Logistics Management*, 40(3):228-246

James, C. Van Horne, John, M. and Wachowicz, Jr., (2005). *Fundamentals of Financial Management, Pearson Education (Singapore)* Pte. Ltd., Indian Branch, Delhi

Jensen, P. H. and Webster. E. M. (2009). What Creates Abnormal Profits: Collusion, Efficiency or Strategy, *Intellectual Property Research Institute of Australia Working Pa-per*:08/09

Kabuga, W. (2012). Lean Procurement Methodologies used by Large Scale Manufacturing Firms in Nairobi, Kenya, *Unpublished MBA Project*, University of Nairobi

KAM. (2014). Kenya Association of Manufacturers, Accessed from *http://www.kam.co.ke/*

Kelly, K. and Maxwell, E.(2003). Sample Size for Multiple Regression: Obtaining Regression Coefficients that are Accurate, *Journal of Psychological Association*, 8(3):305-321

Khan, Y. & Jain, K. (2003).*Financial Management Text and Problems*, Tata McGraw Hill Publishing Company Limited, New Delhi

Knemeyer, M., Ponzurick, G., and Logar, M. (2002). A Qualitative Examination of Factors Affecting Reverse Logistics Systems for end-of-life Computers, *International Journal of Physical Distribution and Logistics Management*, 32 (6):455-479.

Kothari, C. R. (2005). *Research methodology: Methods & techniques*. New Delhi: New Age International (P) Ltd.

Kulp, C., Lee, L., Ofek, E. (2004). Manufacturer Benefits from Information Integration with Retail Customers, *Management Science*, 50(4):431-444

Lim, S. H. and Lovell, A. (2009). Profit and Productivity of US Class I Railroads. *Managerial and Decision Economics*, forthcoming

Maheshwari, N. (2001).*Principles of Management Accounting*, Sultan hand 7 Sons, New Delhi

Malone, R. (2004).Supply chain loop: Reverse Logistics and the SCOR model, InboundLogistics,January,pp.6870,availableat*:www.inboundlogistics.com/cms /article/closing-the-supply-chain-loop-reverse-logistics-and-the-scor-model/,*

Markley, J. and Davis, L. (2007). Exploring Future Competitive Advantage through Sustainable Supply Chains, *International Journal of Physical Distribution and Logistics Management*, 39(9):763-774

Mason, S. (2002). Backward Progress, *IIE Solutions*, 34(8):42-46

Mollenkopf, A., Rabinovich, E., Laseter, M., and Boyer, K. (2007).Managing internet Product Returns: A focus on Effective Service Operations, *Decision Sciences*, 38(2):215-250

Mueller, D. C. (1990).*The Dynamics of Company Profits. Cambridge*: Cambridge University Press

Mukhopadhyay, K. and Setoputro, R. (2004). Reverse Logistics in E-business: Optimal Price and Return Policy, *International Journal of Physical Distribution and Logistics Management*, 34(1):70-88

Ngui, D.M. (2008). *On the Efficiency of the Kenyan Manufacturing Sector: An Empirical Analysis*, Shaker, Aachen.

Okoli, C., Pawlowski, S.D. (2004). The Delphi Method as a Research Tool: an example, design consideration and applications, *Information & Management*, 4(1):15-29.

Ongombe, J. (2012). Reverse Logistics and Competitive Advantage, *Unpublished MBA Project*, University of Nairobi

Petersen, A., and. V. Kumar (2010). Can Product Returns Make You Money, *MIT Sloan Management Review*, Spring, 51(3): 8

Reverse Logistics Executive Council. (2007). Glossary, available at: www.rlec.org/glossary.html

Richey, G., Genchev, E. and Daugherty, J. (2005). The role of resource commitment and innovation in reverse logistics performance, *International Journal of Physical Distribution and Logistics Management*, 35(4):233-257

Rogers, Dale S. and Ronald Tibben-Lembke, S. (1999). Going Backwards: Reverse Logistics Trends and Practices. Reno: *Reverse Logistics Executive Council*.

Serut**,** C. (2013). Adoption of Reverse Logistics on Performance of. Does your Organization in Nairobi, *Unpublished MBA*, University of Nairobi.

Srivastava, K. and Srivastava, K. (2006). Managing Product Returns for Reverse Logistics, *International Journal of Physical Distribution and Logistics Management*, 36(7):524-546.

Stank, P. and Emmelhainz, A. and Daugherty, J. (1996). The Impact of Information on Supplier Performance, *Journal of Marketing Theory & Practice*, 4(4):94-105.

Stank, T.P., Keller, S.B., Daugherty, P.J. (2001).Supply Chain Collaboration and Logistical Service Performance, *Journal of Business Logistics*, 22 (1):29-48.

Stock, R. and Mulki, P. (2009). Product Returns Processing: An Examination of Practices of Manufacturers, Wholesalers/Distributors, and Retailers. *Journal of Business Logistics*, 30(1):1-2.

Tibben-Lembke, R.S., Rogers, D.S. (2002). Differences between Forward and Reverse Logistics in a Retail Environment, *Supply Chain Management: An International Journal*, 7(5):271-82.

World Manufacturing Production. (2014). Report on world manufacturing production, *http://www.unido.org//fileadmin/user_media/Publications/Research_and_statistics/Branch_publications/Research_and_Policy/Files/Reports/World_Manufacturing_Production_Reports/STA_Report_on_Quarterly_production_2014Q1.pdf.*

Zhu, Q., and Sarkis, J. (2007). The moderating Effects of Institutional Pressures on Emergent Green Supply Chain Practices and Performance, *International Journal of Production Research*, 45 (18/19):4333-4355.

Appendix I: Research Questionnaire

Part A: Reverse Logistics Practices

To what extent has your firm implemented the following Reverse Logistics Practices in its work place, using a five point scale below, Please tick appropriately against each statement. The scale stand for the following: 1 = No Extent at All; 2= Small Extent; 3= Moderate Extent; 4= Great Extent; 5= Very Great Extent

Reverse Logistics Practices	**Extent**				
	No extent at all	**Small Extent**	**Moderate Extent**	**Great Extent**	**Very Great Extent**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
1.Remanufacuring Practices					
The manufacturing firms collect used products from customers to make new products					
The manufacturing firms saves transport costs and costs of purchasing raw materials					
Manufacturing firms preserve the environment					
Manufacturing firms buy used products from customers at a cheaper price					
Manufacturing firms reduce the cost of raw materials by over 70 per cent					
Manufacturing firms increases cost effectiveness in the flow of raw materials.					
Manufacturing firms increases profitability through effective management of reverse logistic of the firm.					
The manufacturing firm has agility through implementation of a good reverse logistics.					
Manufacturing firm uses reverse logistic to have competive advantage and reduce customer risk when buying products.					

Manufacturing firms strategically plan for reverse logistic					
2.Recycling Practices					
The manufacturing firms are able to produce more products and thus satisfy the market in terms of mainstreaming and sustaining its supply chain					
The manufacturing firms save the environment from potential deterioration.					
Manufacturing firms hires a recycling firm to recycle its products					
Manufacturing firms use the products to be recycled as raw materials to produce other products					
The manufacturing firms select raw material they are interested in from a collected used products from consumers.					
The manufacturing firms remove biodegradable waste from the surrounding environment					
The manufacturing firms collect used products from customer with the aim of entirely modifying them again					
The manufacturing firms save costs of purchasing raw materials					
3. Packaging Practices					
The manufacturing firms receives wrongly packaged products from customers					
The manufacturing firms repackage the product and resend the same product to the market					

The distributor returns the product for repackaging to the manufacturing firm and thus the firm is able to save transport costs					
Through repackaging the manufacturing firm is able to portray a high levels of responsibility and care for the end users					
The manufacturing firms repackage their products to increase market share and sales and profit					
The manufacturing firms use repackaging method as means of saving on cost of production of new product					
The manufacturing firms repackage damaged products which are beyond salable attractiveness					
The manufacturing firm repackage and resale product from the customers increasing their profitability.					
4. Landfill Practices					
The Manufacturing firm has a landfill for purposes of waste management					
Manufacturing firms incur less costs as compared to hiring a waste collector					
The manufacturing firms have a zero-landfill goal literally that send less waste to a landfill than a single household does					
Manufacturing firm tap massive amounts of energy from landfill gases					
Manufacturing firms practice environmental responsibility to ensure that such waste does not come into contact with the environment					

and the public altogether					
The manufacturing firm uses landfill to deposit waste which is unusable and non-recyclable.					
The manufacturing firm uses landfills to reduce cost of handling and transportation of waste.					
The manufacturing firm used landfill to deposit wastes as it is cheaper and environmentally friendly.					
The manufacturing firm have landfill sites for waste management purposes					
The manufacturing firm use landfills to comply with the environmental and health policies.					
5.Reverse Engineering Practices					
Manufacturing firms examine a competitors product in order to identify opportunities for product improvement and cost reduction					
Manufacturing firm is able to gain a competitive edge against its competitor					
The manufacturing firms is able learn more about the processes of manufacturing a product and the costs involved					
Manufacturing firms produce value added goods and services					
Manufacturing firms is able to achieve efficiency in their operations					
The manufacturing firms can compete with the best performing firms					
The manufacturing firm outweigh competitors through reverse engineering					
The manufacturing firm is involved in					

copyright infringement court cases.					
The manufacturing firm use reverse reengineering to benchmark their products design with that of the competitors					
The manufacturing firm implement reverse engineering to enhance competive advantage and increase profitability					

PART B: The relationship between Reverse Logistics Practices and Profitability of large scale manufacturing Firms in Nairobi, Kenya. Please provide the requested data as provided in the table below:

No	Statement	2013
1	Sales	
2	RAOCE	
3	NIAT	
4	Market Share	
5	Cost Reduction	

THANK YOU FOR YOUR TIME

APPENDIX II: LARGE SCALE MANUFACTURING FIRMS IN NAIROBI, KENYA

Below is a list of large scale manufacturing firms clustered based on their functions

Sector: Building, Construction and Mining (6)	
Central Glass Industries Ltd	Kenya Builders & Concrete Ltd
Karsan Murji & Company Limited	Manson Hart Kenya Ltd
Kenbro Industries Ltd	Mombasa Cement Ltd
Sector: Food, Beverages and Tobacco (6)	
Central Glass Industries Ltd	Kenya Builders & Concrete Ltd
Karsan Murji & Company Limited	Manson Hart Kenya Ltd
Kenbro Industries Ltd	Mombasa Cement Ltd
Sector: Food, Beverages and Tobacco (100)	
Africa Spirits Ltd Highlands	Mineral Water Co. Ltd
Agriner Agricultural Development Limited	Homeoil
Belfast Millers Ltd Insta	Products (EPZ) Ltd
Bidco Oil Refineries Ltd	Jambo Biscuits (K) Ltd
Bio Foods Products Limited	Jetlak Foods Ltd
Breakfast Cereal Company(K) Ltd	Karirana Estate Ltd
British American Tobacco Kenya Ltd	Kenafric Industries Limited
Broadway Bakery Ltd	Kenblest Limited
C. Czarnikow Sugar (EA) Ltd	Kenya Breweries Ltd
Cadbury Kenya Ltd Kenya	Nut Company Ltd
Centrofood Industries Ltd	Kenya Sweets Ltd
Coca cola East Africa Ltd	Nestle Kenya Ltd
Confec Industries (E.A) Ltd	Nicola Farms Ltd
Corn Products Kenya Ltd	Palmhouse Dairies Ltd
Crown Foods Ltd	Patco Industries Limited
Cut Tobacco (K) Ltd	Pearl Industries Ltd
Deepa Industries Ltd	Pembe Flour Mills Ltd
Del Monte Kenya Ltd	Premier Flour Mills Ltd

East African Breweries Ltd	Premier Food Industries Limited
East African Sea Food Ltd	Proctor & Allan (E.A.) Ltd
Eastern Produce Kenya Ltd	Promasidor (Kenya) Ltd
Farmers Choice Ltd	Trufoods Ltd
Frigoken Ltd	UDV Kenya Ltd
Giloil Company Limited	Unga Group Ltd
Glacier Products Ltd	Usafi Services Ltd
Global Allied Industries Ltd	Uzuri foods Ltd
Global Beverages Ltd	ValuePak Foods Ltd
Global Fresh Ltd W.E.	Tilley (Muthaiga) Ltd
Gonas Best Ltd	Kevian Kenya Ltd
Hail & Cotton Distillers Ltd	Koba Waters Ltd
Al-Mahra Industries Ltd	Kwality Candies & Sweets Ltd
Alliance One Tobacco Kenya Ltd	Lari Dairies Alliance Ltd
Alpha Fine Foods Ltd	London Distillers (K) Ltd
Alpine Coolers Ltd	Mafuko Industries Ltd
Annum Trading Company Limited	Manji Food Industries Ltd 61
Aquamist Ltd	Melvin Marsh International
Brookside Dairy Ltd	Kenya Tea Development Agency
Candy Kenya Ltd	Mini Bakeries (Nbi) Ltd
Capwelll Industries Ltd	Miritini Kenya Ltd
Carlton Products (EA) Ltd	Mount Kenya Bottlers Ltd
Chirag Kenya Limited	Nairobi Bottlers Ltd
E & A Industries Ltd	Nairobi Flour Mills Ltd
Kakuzi Ltd	NAS Airport Services Ltd
Erdemann Co. (K) Ltd	Rafiki Millers Ltd
Excel Chemical Ltd	Razco Ltd
Kenya Wine Agency Limited	Re-Suns Spices Limited
Highlands Canner Ltd	Smash Industries Ltd
Super Bakery Ltd	Softa Bottling Co. Ltd
Sunny Processor Ltd	Spice World Ltd
Spin Knit Dairy Ltd	Wrigley Company (E.A.) Ltd

Sector: Chemical and Allied (62)	
Anffi Kenya Ltd	Crown Berger Kenya Ltd
Basco Product (K) Ltd	Crown Gases Ltd
Bayer East Africa Ltd	Decase Chemical (Ltd)
Continental Products Ltd	Deluxe Inks Ltd
Cooper K- Brands Ltd	Desbro Kenya Limited
Cooper Kenya Limited	E. Africa Heavy Chemicals (1999) Ltd
Beiersdorf East Africa Ltd	Elex Products Ltd
Blue Ring Products Ltd	European Perfumes & Cosmetics Ltd
BOC Kenya Limited	Galaxy Paints & Coating Co. Ltd
Buyline Industries Limited	Grand Paints Ltd
Carbacid (CO2) Limited	Henkel Kenya Ltd
Chemicals & Solvents E.A. Ltd	Imaging Solutions (K) Ltd
Chemicals and Solvents E.A. Ltd	Interconsumer Products Ltd
Coates Brothers (E.A.) Limited	Odex Chemicals Ltd
Coil Products (K) Limited	Osho Chemicals Industries Ltd
Colgate Palmolive (E.A) Ltd	PolyChem East Africa Ltd
Johnson Diversity East Africa Limited	Procter & Gamble East Africa Ltd
Kel Chemicals Limited	PZ Cussons Ltd
Kemia International Ltd	Rayal Trading Co. Ltd
Ken Nat Ink & Chemical Ltd	Reckitt Benckiser (E.A) Ltd
Magadi Soda Company Ltd	Revolution Stores Co. Ltd
Maroo Polymers Ltd	Soilex Chemical Ltd
Match Masters Ltd	Strategic Industries Limited
United Chemical Industries Ltd	Supa Brite Ltd
Oasis Ltd	Unilever Kenya Ltd
Rumorth EA Ltd	Murphy Chemical E.A Ltd
Rumorth East Africa Ltd	Syngenta East Africa Ltd 62
Sadolin Paints (E.A.) Ltd	Synresins Ltd
Sara Lee Kenya Limited	Tri-Clover Industries (K) Ltd
Saroc Ltd	Twiga Chemical Industries Limited
Super Foam Ltd	Vitafoam Products Limited

Sector: Energy, Electrical and Electronics (42)	
A.I Records (Kenya) Ltd	East African Cables Ltd
Amedo Centre Kenya Ltd	Eveready East Africa Limited
Assa Abloy East Africa Ltd	Frigorex East Africa Ltd
Aucma Digital Technology Africa Ltd	Holman Brothers (E.A.) Ltd
Avery (East Africa) Ltd	IberaAfrica Power (EA) Ltd
Baumann Engineering Limited	International Energy Technik Ltd
Centurion Systems Limited	Kenwest Cables Ltd
Digitech East Africa Limited	Kenwestfal Works Ltd
Manufacturers & Suppliers (K) Ltd	Kenya Power & Lighting Co. Ltd
Marshall Fowler (Engineers) Ltd	Kenya Scale Co. Ltd/ Avery
Mecer East Africa Ltd	Kenya Ltd
Metlex Industries Ltd	Kenya Shell Ltd
Metsec Ltd	Libya Oil Kenya Limited
Modulec Engineering Systems Ltd	Power Technics Ltd
Mustek East Africa Sanyo	Reliable Electricals Engineers Ltd
Nationwide Electrical Industries	Armo (Kenya) Ltd
Nationwide Electrical Industries Ltd	Socabelec East Africa
Optimum Lubricants Ltd	Sollatek Electronics (Kenya) Limited
PCTL Automation Ltd	Specialised Power Systems Ltd
Pentagon Agencies Tea	Synergy-Pro
Power Engineering International Ltd	Vac Machinery Limited
Sector: Plastics and Rubber (54)	
Betatrad (K) Ltd	ACME Containers Ltd
Blowplast Ltd	Afro Plastics (K) Ltd
Bobmil Industries Ltd	Alankar Industries Ltd
Complast Industries Limited	Dune Packaging Ltd
Kenpoly Manufacturers Ltd	Elgitread (Kenya) Ltd
Kentainers Ltd	Elgon Kenya Ltd
King Plastic Industries Ltd	Eslon Plastics of Kenya Ltd
Kingway Tyres & Automart Ltd	Five Star Industries Ltd
L.G. Harris & Co. Ltd	General Plastics Limited

Laneeb Plastics Industries Ltd	Haco Industries Kenya Ltd
Metro Plastics Kenya Limited	Hi-Plast Ltd
Ombi Rubber Rollers Ltd	Jamlam Industries Ltd
Packaging Industries Ltd	Kamba Manufacturing (1986) Ltd
Plastics & Rubber Industries Ltd	Keci Rubber Industries
Polyblend Limited	Nairobi Plastics Industries
Polyflex Industries Ltd	Nav Plastics Limited
Polythene Industries Ltd	Ombi Rubber
Premier Industries Ltd	Packaging Masters Limited
Prestige Packaging Ltd	Plastic Electricons
Prosel Ltd	Raffia Bags (K) Ltd
Qplast Industries	Rubber Products Ltd
Sumaria Industries Ltd	Safepak Limited
Super Manufacturers Ltd	Sameer Africa Ltd
Techpak Industries Ltd	Sanpac Africa Ltd
Treadsetters Tyres Ltd	Silpack Industries Limited
Uni-Plastcis Ltd	Solvochem East Africa Ltd
Wonderpac Industries Ltd	Springbox Kenya Ltd
Sector: Textile and Apparels (38)	
Africa Apparels EPZ Ltd	MRC Nairobi (EPZ) Ltd
Fulchand Manek & Bros Ltd	Ngecha Industries Ltd
Image Apparels Ltd	Premier Knitwear Ltd
Alltex EPZ Ltd	Protex Kenya (EPZ) Ltd
Alpha Knits Limited	Riziki Manufacturers Ltd
Apex Appaels (EPZ) Ltd	Rolex Garments EPZ Ltd
Baraka Apparels (EPZ) Ltd	Silver Star Manufacturers Ltd
Bhupco Textile Mills Limited	Spinners & Spinners Ltd
Blue Plus Limited	Storm Apparel Manufacturers Co. Ltd
Bogani Industries Ltd	Straightline Enterprises Ltd
Brother Shirts Factory Ltd	Sunflag Textile & Knitwear Mills Ltd
Embalishments Ltd	Tarpo Industries Limited
J.A.R Kenya (EPZ) Ltd	Teita Estate Ltd

Kenya Trading EPZ Ltd	Thika Cloth Mills Ltd
Kikoy Co. Ltd	United Aryan (EPZ) Ltd
Le-Stud Limited	Upan Wasana (EPZ) Ltd
Metro Impex Ltd	Vaja Manufacturers Limited
Midco Textiles (EA) Ltd	Yoohan Kenya EPZ Company Ltd
Mirage Fashionwear EPZ Ltd	YU-UN Kenya EPZ Company Ltd
Sector: Timber, Wood Products and Furniture (22)	
Economic Housing Group Ltd	Rosewood Office Systems Ltd
Eldema (Kenya) Limited	Shah Timber Mart Ltd
Fine Wood Works Ltd	Shamco Industries Ltd
Furniture International Limited	Slumberland Kenya Limited
Hwan Sung Industries (K) Ltd	Timsales Ltd
Kenya Wood Ltd	Wood Makers Kenya Ltd
Newline Ltd	Woodtex Kenya Ltd
PG Bison Ltd	United Bags Manufacturers Ltd
Transpaper Kenya Ltd	Statpack Industries Ltd
Twiga Stationers & Printers Ltd	Taws Limited 64
Uchumi Quick Suppliers Ltd	Tetra Pak Ltd
Sector: Pharmaceutical and Medical Equipment (20)	
Alpha Medical Manufacturers Ltd	Dawa Limited
Beta Healthcare International Limited	Elys Chemical Industries
Biodeal Laboratories Ltd	Gesto Pharmaceutical Ltd
Bulks Medical Ltd	Glaxo Smithkline Kenya Ltd
Cosmos Limited	KAM Industries Ltd
Laboratory & Allied Limited	KAM Pharmacy Limited
Manhar Brothers (K) Ltd	Pharmaceutical Manufacturing Co.
Madivet Products Ltd	Regals Pharmaceuticals
Novelty Manufacturing Ltd	Universal Corporation Limited
Oss. Chemie (K) Pharm	Access Africa Ltd
Sector: Metal and Allied (38)	
Allied Metal Services Ltd	Booth Extrusions Limited
Alloy Street Castings Ltd	City Engineering Works Ltd

Apex Street Ltd	Rolling Mill Division Crystal Industries Ltd
ASL Ltd	Davis & Shirtliff Ltd
ASP Company Ltd	Devki Steel Mills Ltd
East Africa Foundry Works (K) Ltd	East Africa Spectre Limited
Elite Tools Ltd	Kens Metal Industries Ltd
Friendship Container Manufacturers	Khetshi Dharamshi & Co. Ltd
General Aluminum Fabricators Ltd	Nampak Kenya Ltd
Gopitech (Kenya) Ltd	Napro Industries Limited
Heavy Engineering Ltd	Specialized Engineer Co. (EA) Ltd
Insteel Limited Steel	Structures Limited
Metal Crown Limited	Steelmakers Ltd
Morris & Co. Limited	Steelwool (Africa) Ltd
Nails & Steel Products Ltd	Tononoka Steel Ltd
Orbit Engineering Ltd	Welding Alloys Ltd
Rolmil Kenya Ltd	Wire Products Limited
Sandvik Kenya Ltd	Viking Industries Ltd
Sheffield Steel Systems Ltd	Warren Enterprises Ltd
Sector: Leather Products and Footwear (8)	
Alpharama Ltd	CP Shoes
Bata Shoe Co. (K) Ltd	Dogbones Ltd
New Market Leather Factory Ltd	East Africa Tanners (K) Ltd
C & P Shoe Industries Ltd	Leather Industries of Kenya Limited
Sector: Motor Vehicle Assembly and Accessories (17)	
Auto Ancillaries Ltd Kenya	Vehicle Manufacturers Limited
Varsani Brakelining Ltd	Labh Singh Harnam Singh Ltd
Bhachu Industries Ltd	Mann Manufacturing Co. Ltd
Chui Auto Spring Industries Ltd	Megh Cushion industries Ltd
Toyota East Africa Ltd Mutsimoto	Motor Company Ltd
Unifilters Kenya Ltd	Pipe Manufacturers Ltd
General Motor East Africa Limited	Sohansons Ltd
Impala Glass Industries Ltd	Theevan Enterprises Ltd

Kenya Grange	Vehicle Industries Ltd
Sector: Paper and Paperboard (48)	
Ajit Clothing Factory Ltd	Conventual Franciscan Friers-Kolbe Press
Associated Papers & Stationery Ltd	Creative Print House
Autolitho Ltd	D.L. Patel Press (Kenya) Limited
Bag and Envelope Converters Ltd	Dodhia Packaging Limited
Bags & Balers Manufacturers (K) Ltd	East Africa Packaging Industries Ltd
Brand Printers	Elite Offset Ltd
Business Forms & Systems Ltd	Ellams Products Ltd
Carton Manufacturers Ltd	English Press Limited
Cempack Ltd	General Printers Limited
Chandaria Industries Limited	Graphics & Allied Ltd
Colour Labels Ltd	Guaca Stationers Ltd
Colour Packaging Ltd	Icons Printers Ltd
Colour Print Ltd	Interlabels Africa Ltd
Kenya Stationers Ltd	Jomo Kenyatta Foundation
Kim-Fay East Africa Ltd	Kartasi Industries Ltd
Paper Converters (Kenya) Ltd	Kenafric Diaries Manufacturers Ltd
Paper House of Kenya Ltd	Kitabu Industries Ltd
Paperbags Limited	Kul Graphics Ltd
Primex Printers Ltd	Label Converters
Print Exchange Ltd	Modern Lithographic (K) Ltd
Printpak Multi Packaging Ltd	Pan African Paper Mills (EA) Limited
Printwell Industries Ltd	Ramco Printing Works Ltd
Prudential Printers Ltd	Regal Press Kenya Ltd
Punchlines Ltd	SIG Combibloc Obeikan Kenya

Source: Kenya Association of Manufacturers (KAM) Directory. June, 2013

Appendix III: Secondary Data

Sales Turnover-Ksh	ROACE	NIAT-KSH	C0ST REDUCTION	MKT SHARE
35,600,000,000	12%	125,000,000	8%	0.3
29,600,000,000	2%	125,000,000	6%	3.2
23,700,000,000	11%	125,000,000	3%	0.6
10,380,000,000	6%	125,000,000	3%	0.3
4,500,000,000	6%	125,000,000	6%	1.7
4,440,000,000	3%	125,000,000	6%	0.3
7,600,000,000	12%	125,000,000	0%	0.4
62,300,000,000	12%	125,000,000	1%	1.6
23,700,000,000	6%	292,000,000	8%	3
13,350,000,000	2%	41,700,000	3%	2.45
53,400,000,000	2%	125,000,000	3%	0.4
125,000,000,000	5%	333,000,000	6%	18.4
53,400,000,000	2%	125,000,000	3%	0.4
31,400,000,000	10%	375,000,000	3%	4.6
51,000,000,000	6%	208,000,000	3%	7.5
13,350,000,000	12%	125,000,000	3%	0.7
4,500,000,000	2%	125,000,000	3%	1.3
4,500,000,000	10%	375,000,000	8%	0.82
8,900,000,000	3%	125,000,000	8%	0.3
4,400,000,000	2%	125,000,000	3%	0.7
37,000,000,000	3%	210,000,000	3%	20.1
4,000,000,000	6%	210,000,000	1%	15.3
8,050,000,000	8%	252,500,000	1%	0.2
9,840,000,000	10%	295,000,000	3%	0.3
41,630,000,000	12%	210,000,000	5%	0.4
3,420,000,000	14%	35,000,000	7%	0.5
35,210,000,000	7%	140,000,000	9%	0.6
7,000,000,000	8%	315,000,000	8%	0.7
8,790,000,000	11%	108,000,000	4%	0.8
60,580,000,000	13%	225,000,000	5%	0.9
2,370,000,000	12%	342,000,000	7%	1